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In Re Application of: HOWLAND, Charles A. Group Art Unit: 1771

Serial No. 09/943,749 Examiner: PIERCE, Jeremy R.

Filed: 08-30-2001 Atty. Dkt. No: W0490/7031

For: METHODS FOR IMPROVING THE DYEBILITY AND PUNCTURE RESISTANCE OF FABRICS COMPRISING HIGH TENACITY FIBERS AND FABRICS PRODUCED BY SUCH METHODS

#49 1/15/03

To: Assistant Commissioner for Patents
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PATENT TRADEMARK OFFICE

CERTIFICATE OF FACSIMILE 37 CFR 1.8: I certify that this correspondence is being faxed to: Examiner Jeremy R. Pierce, at FAX #: 703-872-9310, TEL #: 703-605-4243, on the below date.

Date: 1/10/03 Sender's signature:

This statement is offered in support of the above application for patent.

## RULE 132 STATEMENT OF CHARLES A. HOWLAND

(37 CFR 1.132)

My name is Charles A. Howland. My qualifications in the field of the invention are as follows. I hold a Bachelor of Science degree in Mechanical Engineering from Massachusetts Institute of Technology. My thesis work focused on extrusion methods for polymer processing. I have spent the last 20 years in industrial research focused on flexible composites and assembly. In addition to the last 11 years as Technical Director of Warwick Mills, I have worked in textile re-enforcement of tires, puncture resistant military tires and other advanced truck tire materials at Michelin Americas Research Corp and at assembly systems at Digital Equipment.

During the last 11 years my research group at Warwick has taken a leadership role in a range of difficult fibers based materials problems. These include the Vectran based crash bags for the Pathfinder, Mir and Beagle Mars missions for Jet Propulsion Lab. We have developed most



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of the Hull, Ballonet and heatseal tape materials for the current generation of Aerostat tethered blimps and the other military and commercial airships. We have patents pending in this field.

Here at Warwick Mills, we are leaders in the development of a new class of puncture resistant materials with applications in Tires, Gloves, Industrial Apparel, and Stab Resistant Vests. We hold pioneering patents in this art and continue to lead the industry in this materials class. We have developed and hold patents in the use of these materials in law enforcement and industrial gloves, and safety suits for protection from ultra high-pressure water.

Objectives of the Invention revisited:

Among the objectives of this and my related inventions are to provide soft, lightweight materials that deliver very high levels of puncture and cut resistance. This invention covers the dense constructions with the novel concept of multiple fiber types in addition this invention extends this work with the addition of dyeabilty. These intimate blends deliver price performance not possible with single fiber type by adding additional dyeable fiber cosmetics and protection can be combined. These new fabrics have higher performance than filament variations and than the homogeneous staple fiber inventions.

Novelty:

The basis or novel aspects of the claimed invention is: The use of high cover fabrics where the weave density is adequate to prevent lateral shifting of the yarns, in combination with fine count intimate blends of high modulus and normal modulus fiber of the staple type. This is a significant development in the protective fabrics area of art. In this area the use of low-density wovens made of filament yarns or course count staple yarns are the current start of the art. These new fabrics are novel for their use of mixed fiber content in fine yarns. The addition of dyeable blends in fine counts extends this novelty.

Art used to support rejections:

The examiner has rejected some claims under 35 USC 102(b) and 35USC103(a) as being unpatentable over Fels et al's '457.

Fels presents a spiral wound sheath over a core filament, composite yarn structure as a means for obscuring its high strength core filament of the yarn from exposure. Fels has a starkly different structure than my construction of blended fibers. Fels core spun yarns will not survive the high weaving frictions involved in my constructions. These core spun yarns are just not suitable for warp in dense constructions. The angle of the wrapper yarns in core spinning makes them very susceptible to axial shifting in the fabric formation zone of the weaving machine. The use of core spun warp yarns in weaving of fine count dense constructions would require multiple new and novel techniques.

In addition to the fundemental difference in structure, Fels deals with and is limited to a much different class of yarns; specifically composite yarns of different construction and greater weight range or denier, suitable only for relatively low density weave construction. Fels states expressly that the DREF2 (process range 18000-360 denier ) process is only suitable for making coarser yarns, in deference to his preferred embodiment DREF3 (process range of 6000 to 300 denier) process. But even this process is likewise limited to making large diameter or heavier fibers and yarns, relative to the weave densities and cover factors of my constructions. As Fels points out with all his examples the yarns he feels are of interest are much larger. In our specification, I point out that in practice warp yarns for dense weaving are subject of severe stresses during weaving and if the yarn is fragile it must be two ply. If any core spun yarns were to be considered suitable for dense constructions it would have to be plied, as a two end yarn or more likely as a three end corded yarn. This would put the lower limit for theoretical application at 720 and 600 denier for the core spun yarns.

It is known that core spun yarns become increasingly fragile as they become smaller. The number of fibers in the cover must fall as the total size of the yarn is reduced. As the cover is thinned out the wrapping fiber layer is easily damaged and dislodged. As a result even the low

end of the DREF process window is total unsuited to the constructions and fabrics I make. Yarns of this type have the wrong surface fiber angle and have the wrong denier range and have fragile wrapper structures any of which would render them inapplicable to this art.

In my opinion, Fels should be withdrawn as a basis of rejection, because of its different structure, obvious limitations, and different dyeing characteristics. Fels teaches the use of core spinning to cover the use of filament core yarns. The use of filament yarns defeats one of the key cost advantages of an all-staple fiber design as enabled by the current invention. The key point is core spinning, intended to make composite yarns of large size which have discrete core and cover domains. See diagram 1 of Fels. Furthermore, the sheath fiber is wrapped over a core filament structure. The fibers of the core and fibers of the cover are very nearly orthogonal to each other. This structure by nature of its geometry maintains clear separation of the to fiber groups. The DREF process is not an intimate blending process. Intimate blending must be accomplished in the opening, carding and sliver combining steps in cotton or worsted system spinning. In these steps the processing is seeking to create substantially parallel and uniform distributions of all the fiber types in roving that will become the final yarn. Therefore Fels is incompatible and inconsistent with the intimate blend technique and structure I teach for improving dyeability and puncture resistance, where fibers of two types are "laid together" (page 8, line 26) substantially in parallel (Figs. 3A and 3B) within a single fiber bundle or within adjacent fiber bundles of a plied yarn (page 19, line 13), or within adjacent yarns.

While core spun yarns have been used to produce a dyable yarn by wrapping an undyable core yarn this is very far afield from the parallel fiber, intimate blend construction underlying my technique. In the case of the core spun method for creation of a dyeable yarn the dyeable wrapping fiber covers and hides the undyeable core yarn. In my dyeable intimate blend, the undyeable fiber is distributed in the yarn and a visually consistent color. Unlike the core spun of Fels, the intimate blend construction must blend the colors of the fibers to create a visually uniform fabric tone.

To further avoid any unintended reading of its claims on Fels, the parallel fiber construction of the two fiber types fully supported in the specification is further circumscribed by

amendments to independent claims 1 and 38 to include a substantially parallel orientation of the specified fibers, contradicting the inherent orthogonal fiber orientation of the Fels wrapped core structure.

The Office rejects some claims under 35 U.S.C. 102(b) as being unpatentable over Opitz. This patent is similar to Fels with respect to its its wrapped sheath on core filament structure, and is similarly distinguished from my invention. Opitz's examples again teach very large yarns, in the order of 900 Denier. The sheath and core technology of Opitz is likewise fundamentally not operable and not useful in the context of the invention. In my opinion, it is similarly not applicable and should be withdrawn as a basis for rejection.

The undersigned declares further that all statements of his own knowledge made herein are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Respectfully submitted this 10TH JAN 2003

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